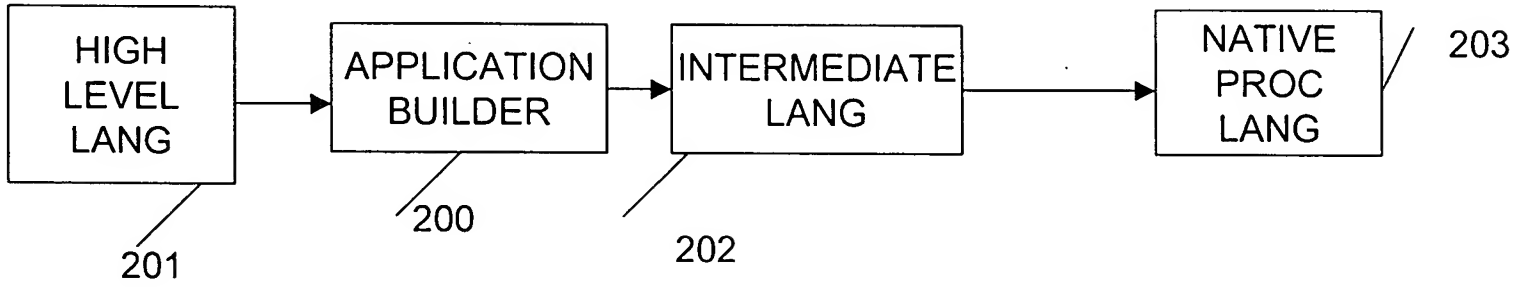


FIGURE 2A

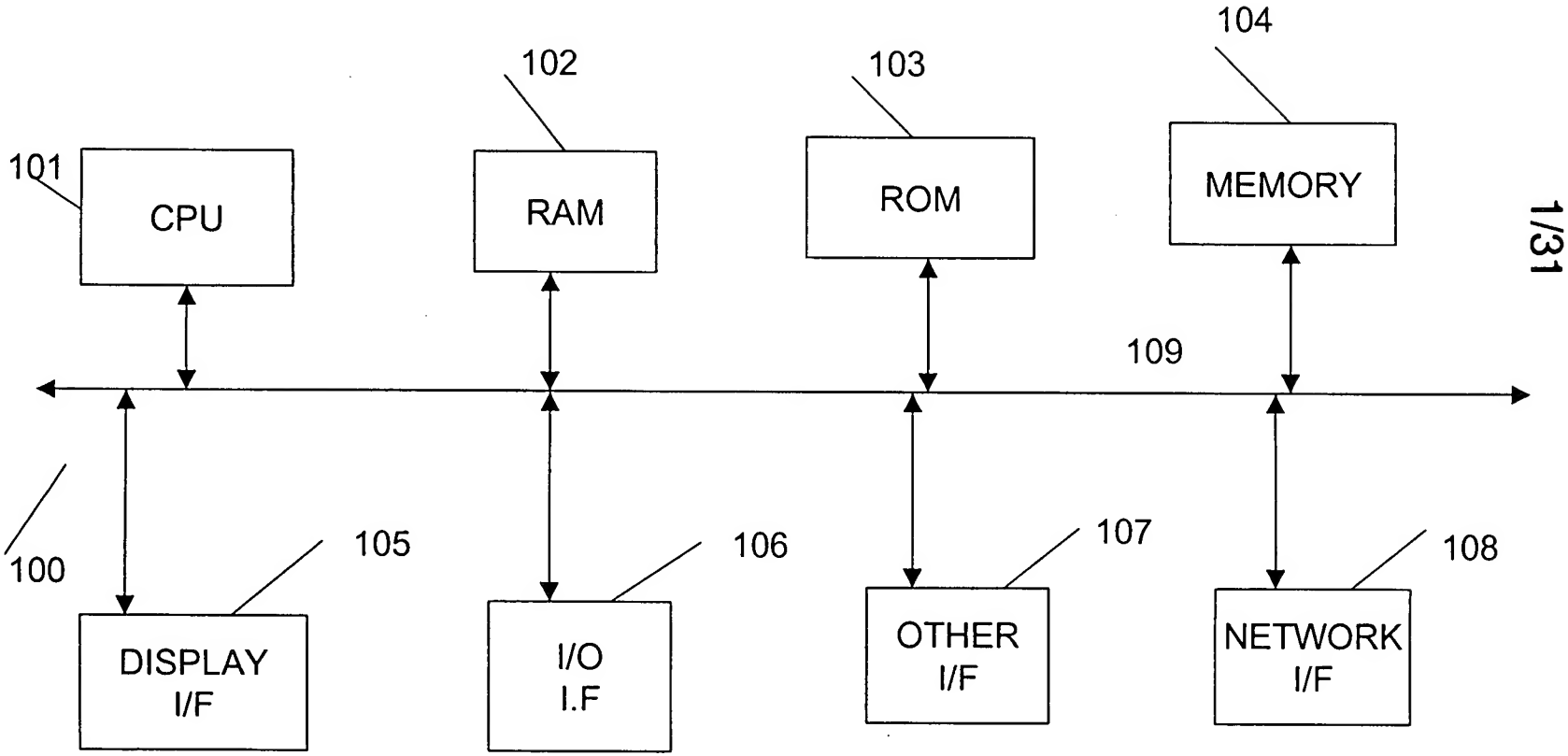


FIGURE 1

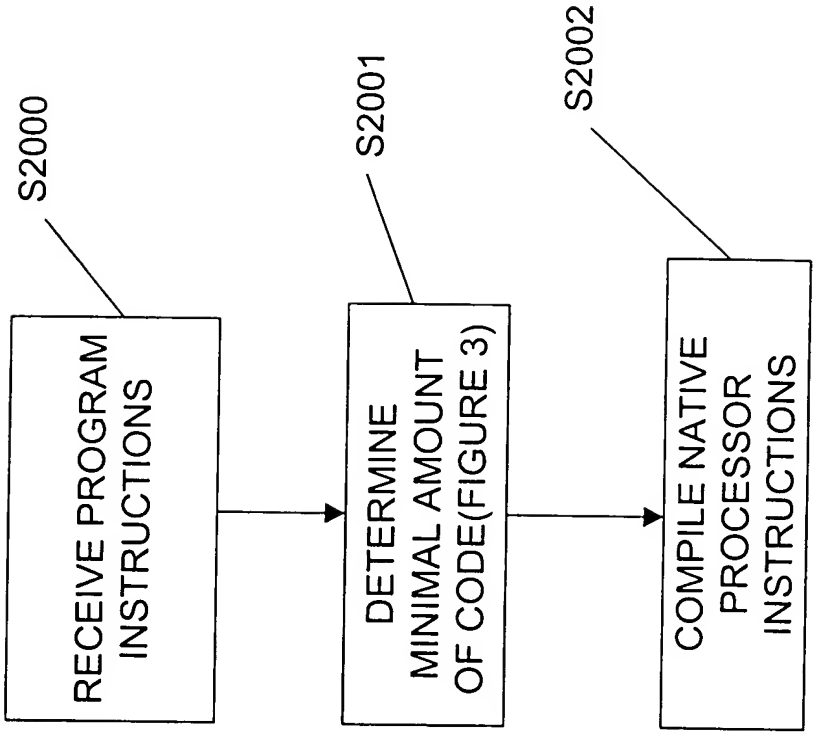

S2000
RECEIVE PROGRAM INSTRUCTIONS
S2001
DETERMINE MINIMAL AMOUNT OF CODE(FIGURE 3)
S2002
COMPILE NATIVE PROCESSOR INSTRUCTIONS

FIGURE 2B

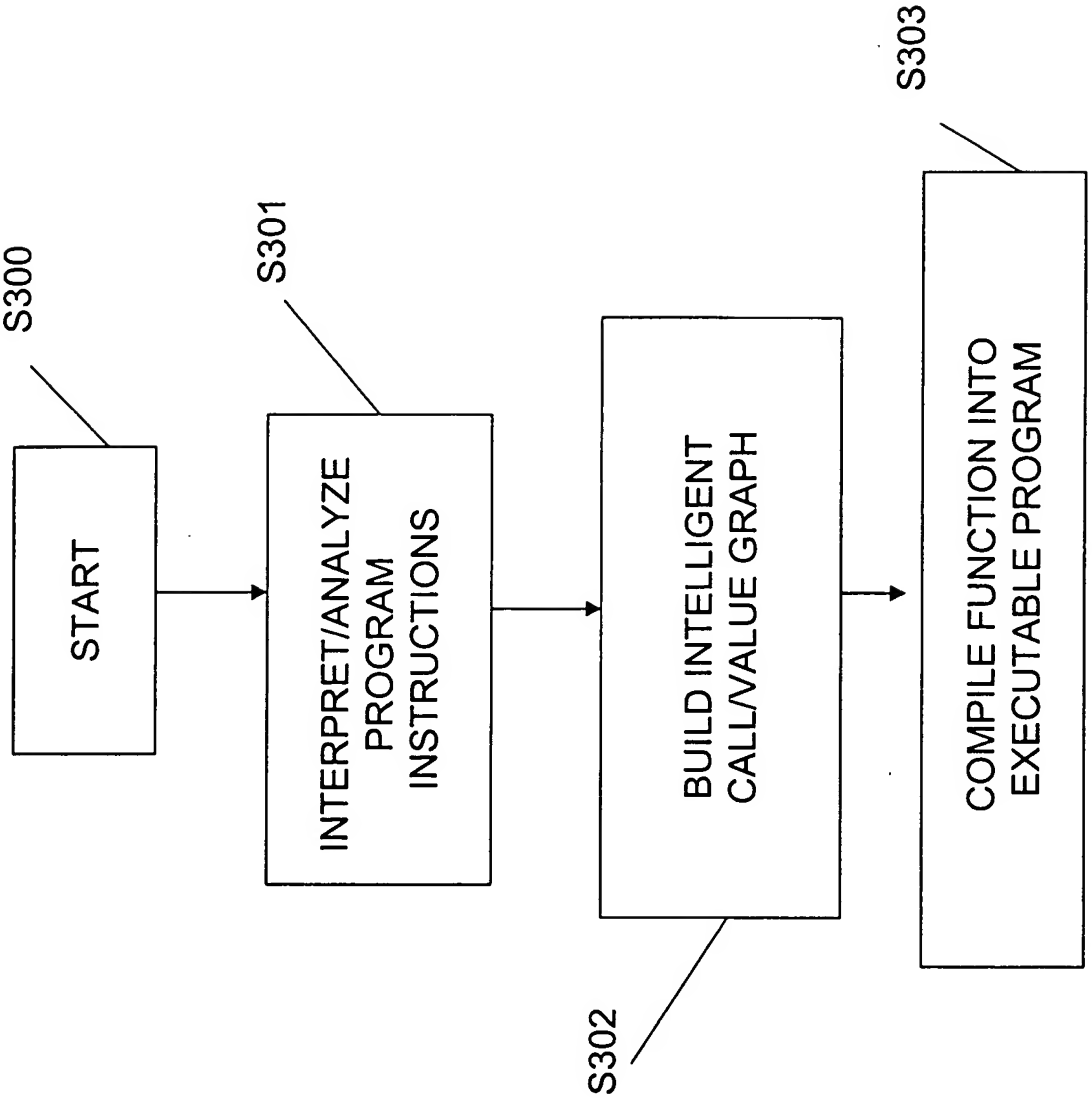

S300
START
S301
INTERPRET/ANALYZE PROGRAM INSTRUCTIONS
S302
BUILD INTELLIGENT CALL/VALUE GRAPH
S303
COMPILE FUNCTION INTO EXECUTABLE PROGRAM

FIGURE 3

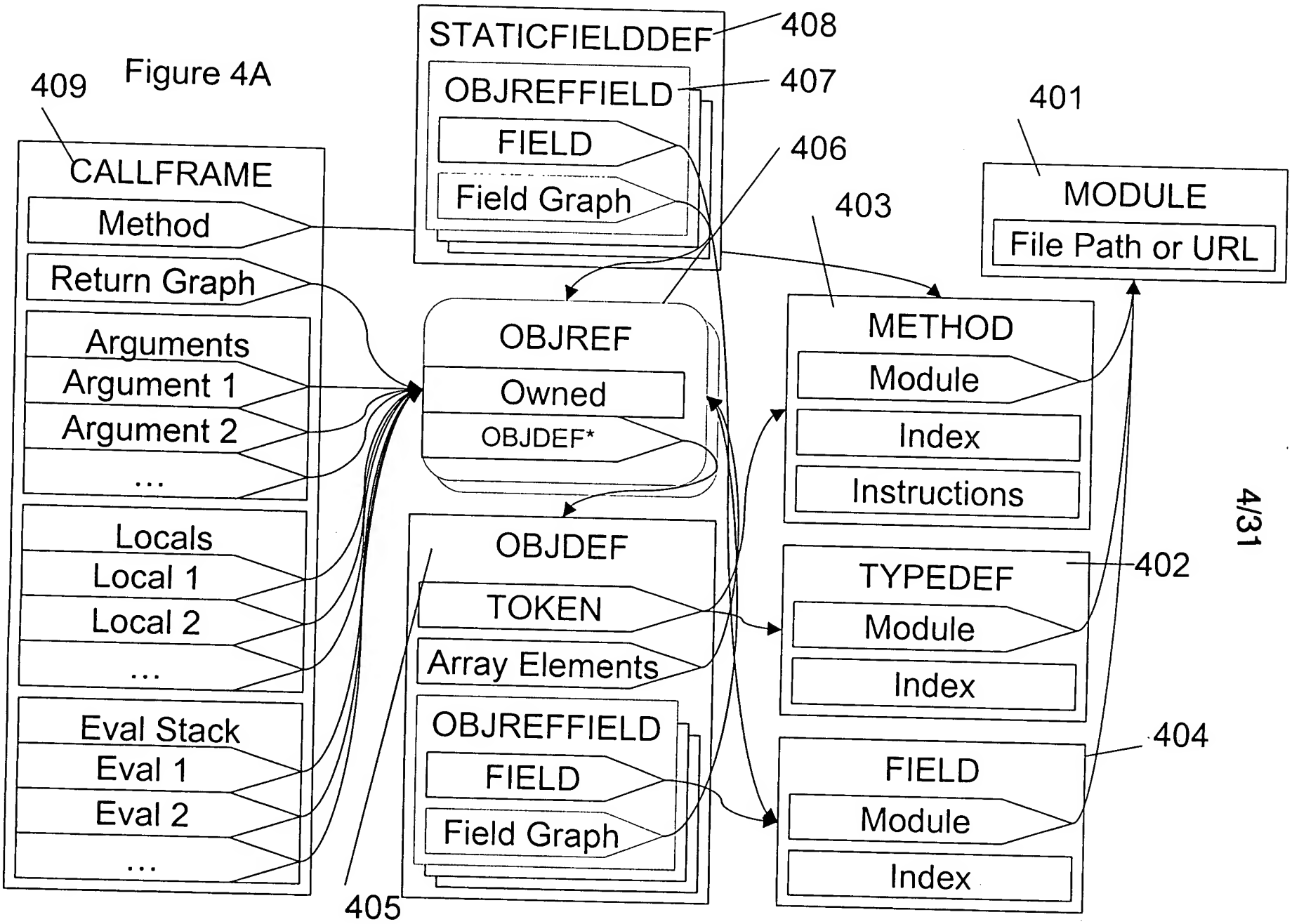


Figure 4A
409
CALLFRAME
Method
Return Graph
Arguments
Argument 1
Argument 2
...
Locals
Local 1
Local 2
...
Eval Stack
Eval 1
Eval 2
...
STATICFIELDDEF
408
OBJREFFIELD
407
FIELD
Field Graph
406
401
MODULE
File Path or URL
403
OBJREF
Owned
OBJDEF*
METHOD
Module
Index
Instructions
OBJDEF
TOKEN
Array Elements
OBJREFFIELD
FIELD
Field Graph
TYPEDEF
Module
Index
402
404
FIELD
Module
Index
405
4/31

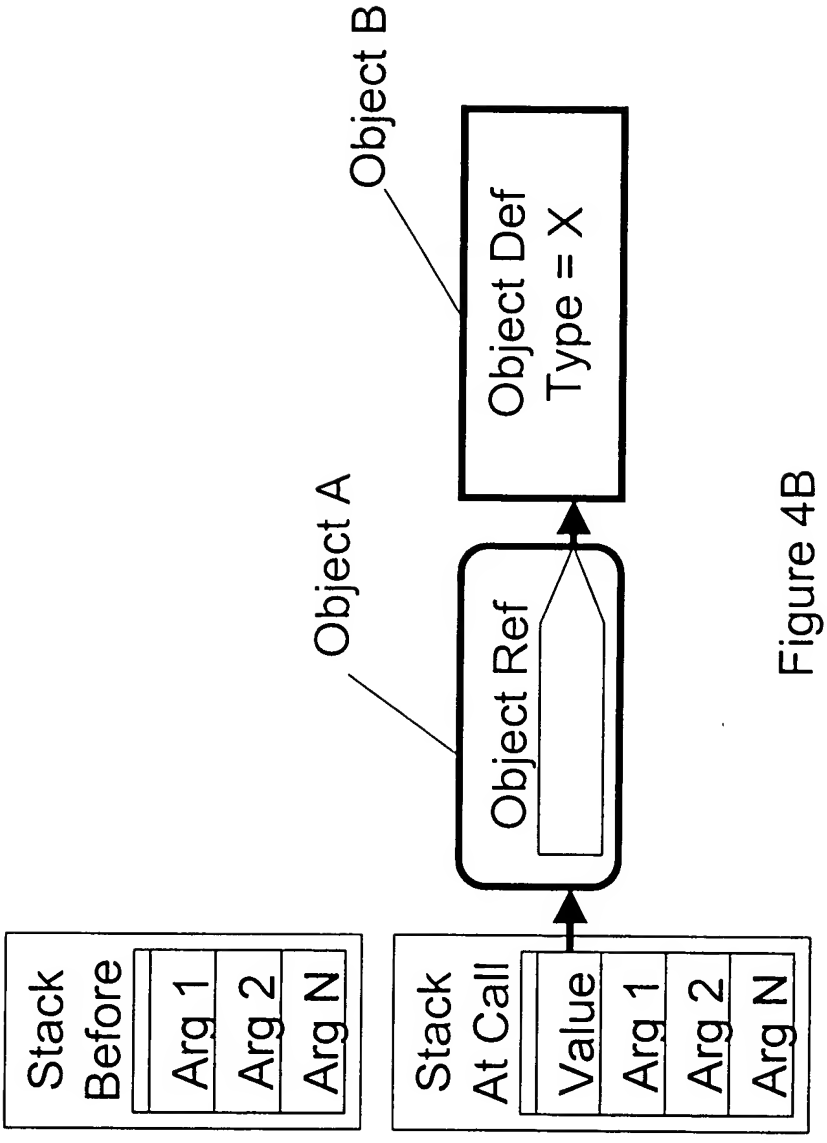

Object B
Object Def
Type = X
Object A
Object Ref
Stack
Before
Arg 1
Arg 2
Arg N
Stack
At Call
Value
Arg 1
Arg 2
Arg N

Figure 4B

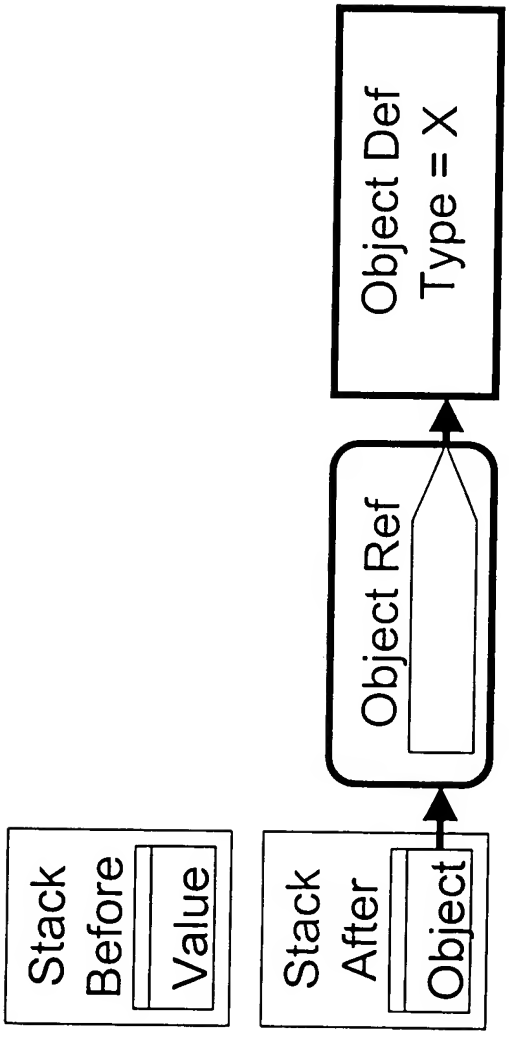

Stack
Before
Value
Stack
After
Object
Object Ref
Object Def
Type = X

Figure 4C

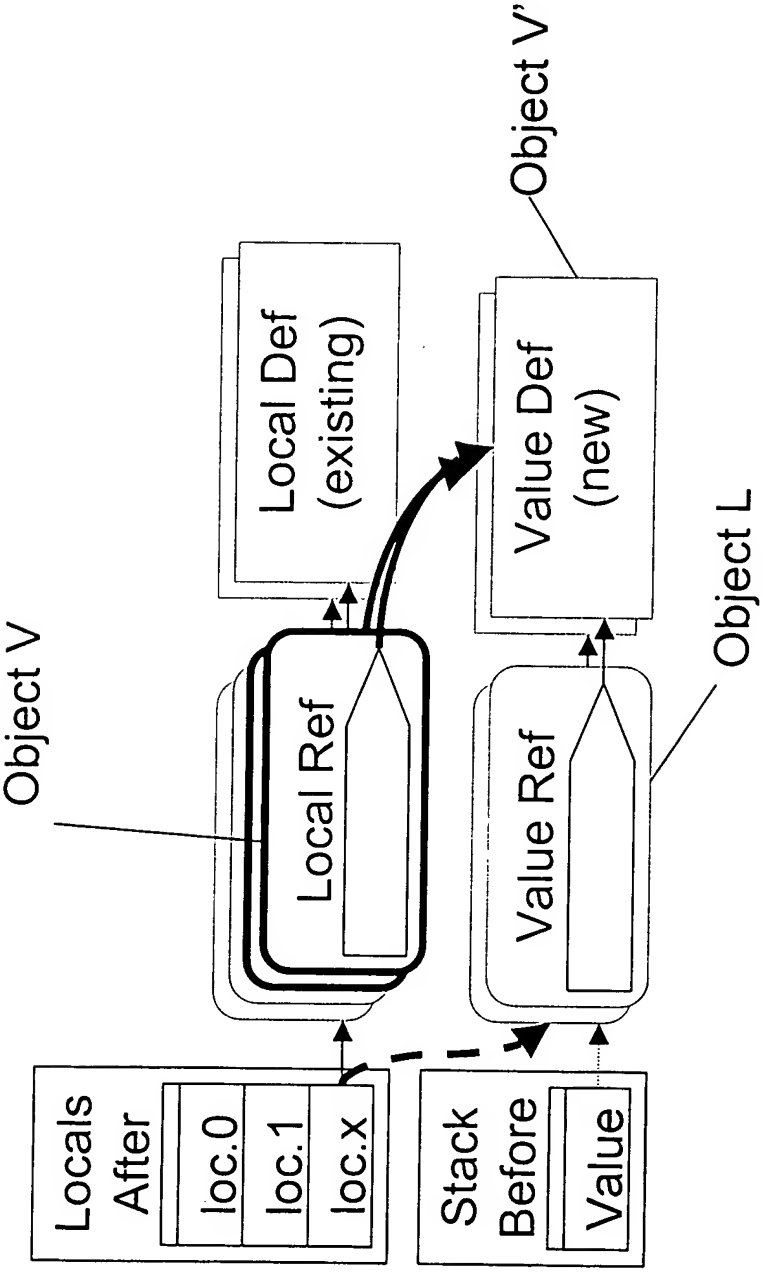

Object V'
Local Def (existing)
Value Def (new)
Object V
Local Ref
Value Ref
Object L
Locals After
loc.0
loc.1
loc.x
Stack Before
Value

Figure 5

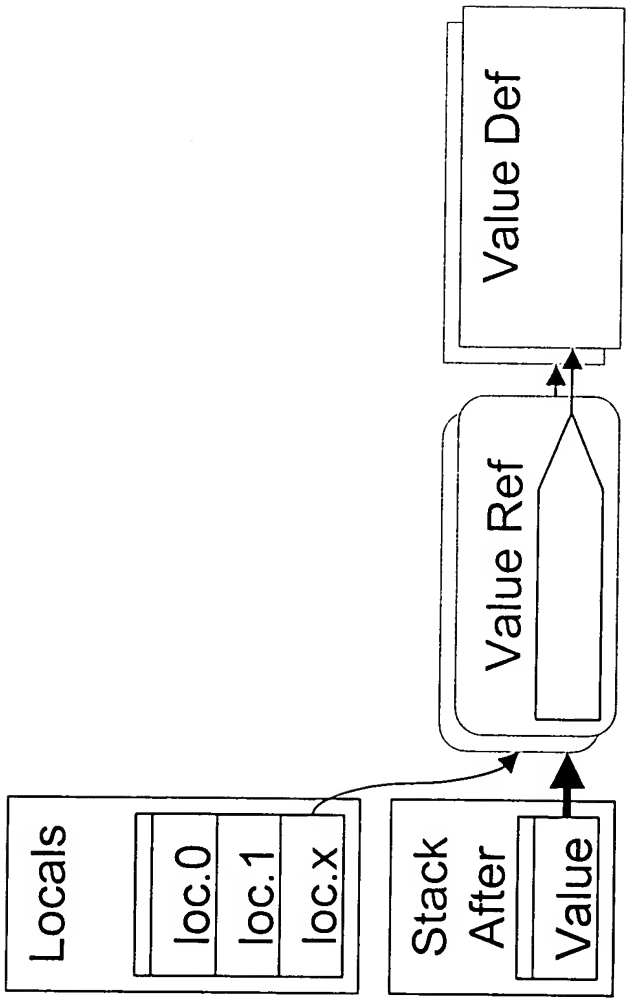


Figure 6

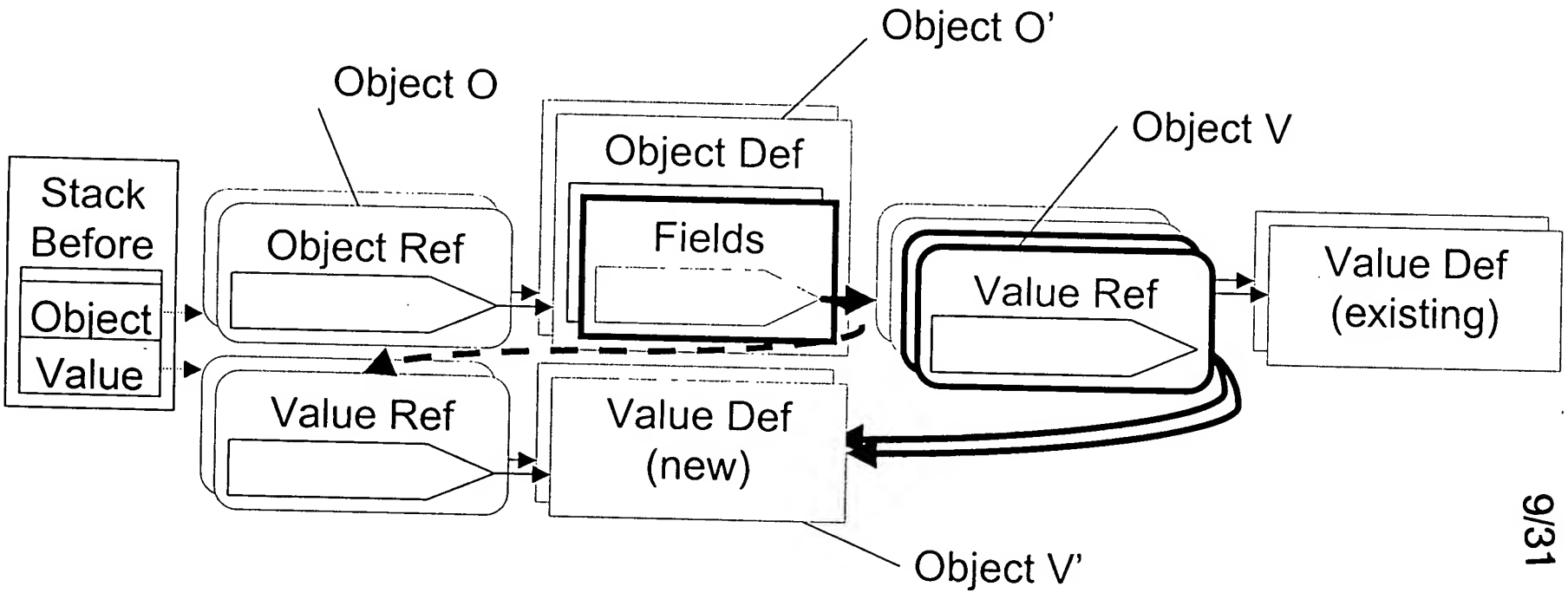

Object O'
Object O
Object V
Object Def
Stack
Before
Object
Value
Object Ref
Fields
Value Ref
Value Def
(existing)
Value Ref
Value Def
(new)
Object V'

Figure 7

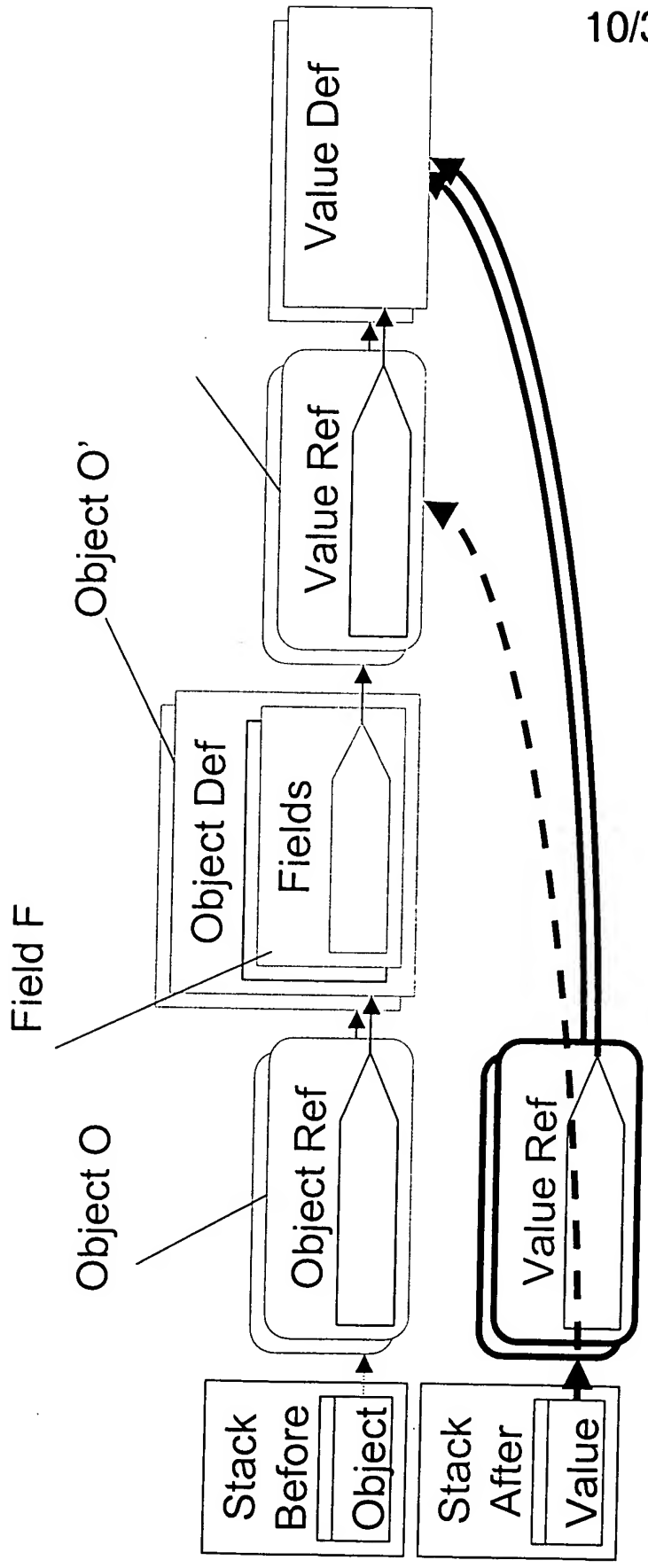

Stack Before
Object
Stack After
Value
Object O
Object Ref
Field F
Object O'
Object Def
Fields
Value Ref
Value Ref
Value Def

Figure 8

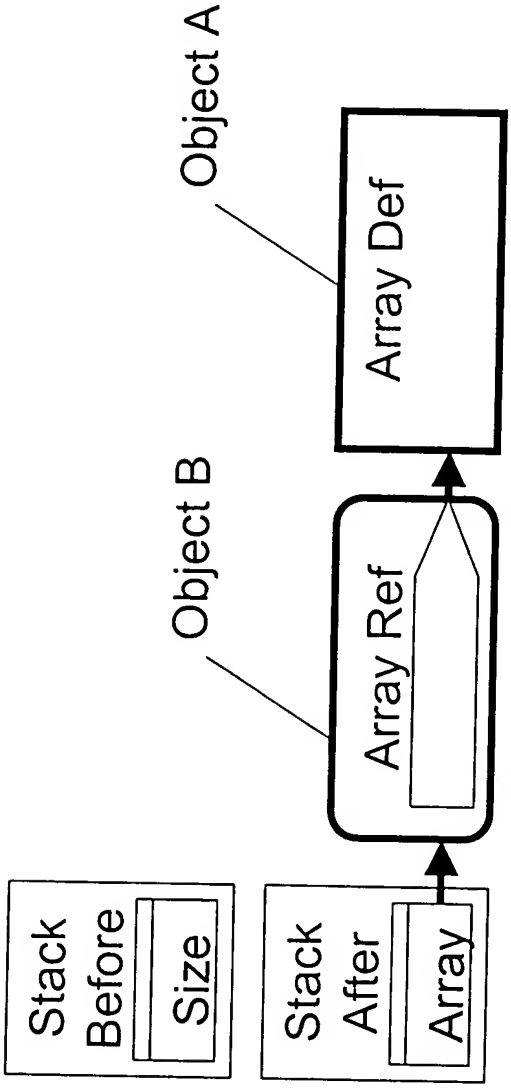

Object A
Array Def
Object B
Array Ref
Stack
Before
Size
Stack
After
Array

Figure 9

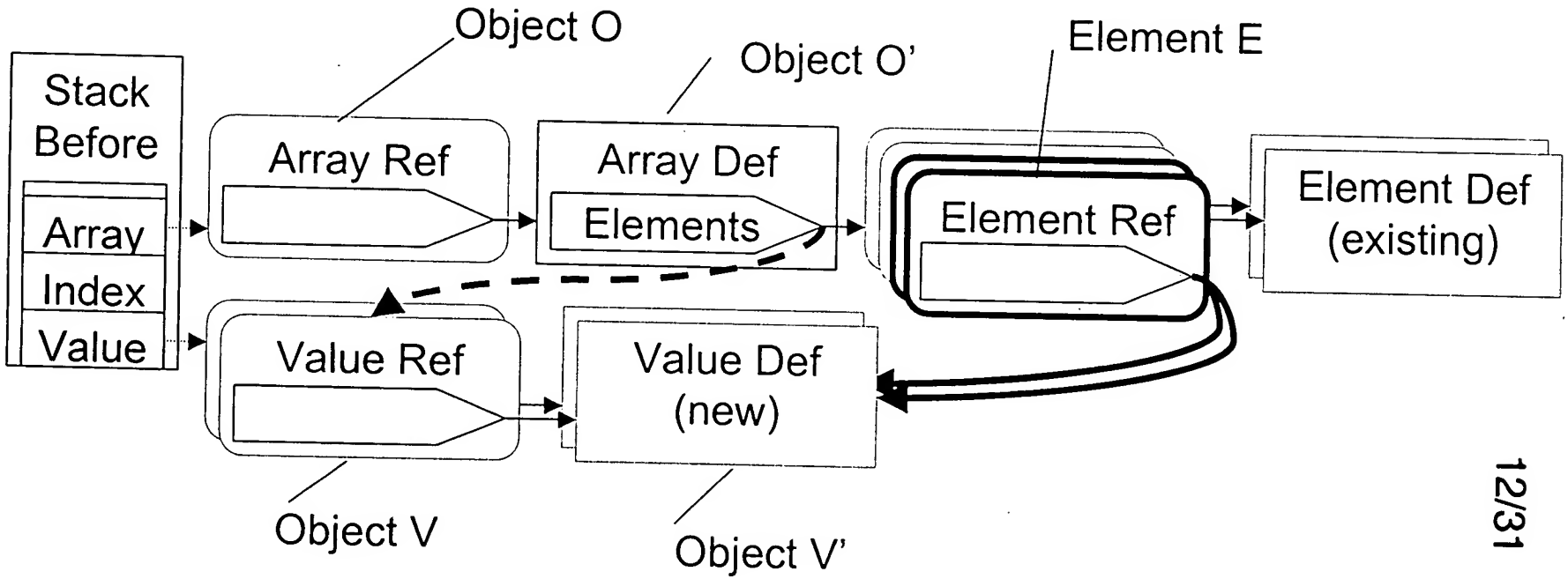

Object O
Object O'
Element E
Stack
Before
Array
Index
Value
Array Ref
Array Def
Elements
Element Ref
Element Def
(existing)
Value Ref
Value Def
(new)
Object V
Object V'

Figure 10

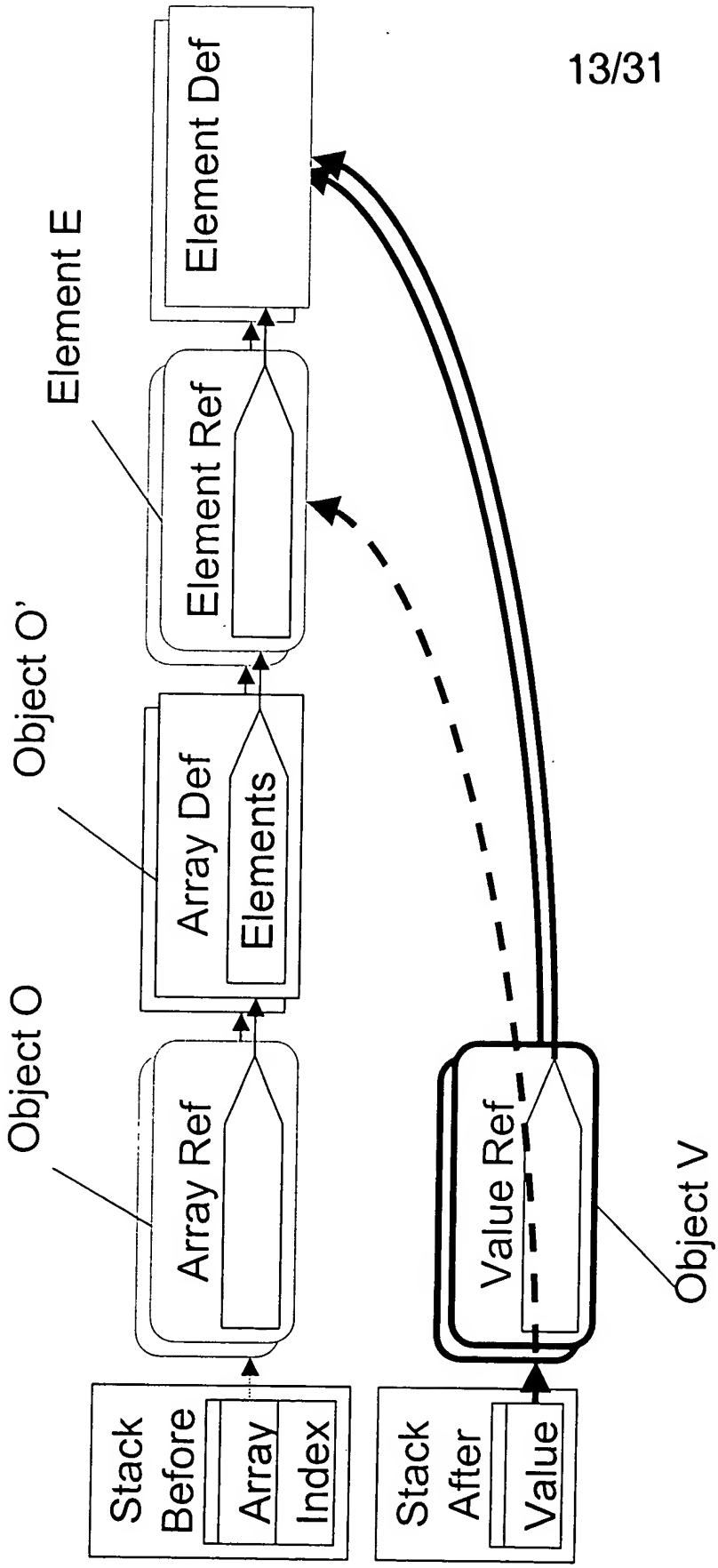

Element Def
Element E
Element Ref
Object O'
Array Def
Elements
Object O
Array Ref
Value Ref
Object V
Stack Before
Array
Index
Stack After
Value

Figure 11

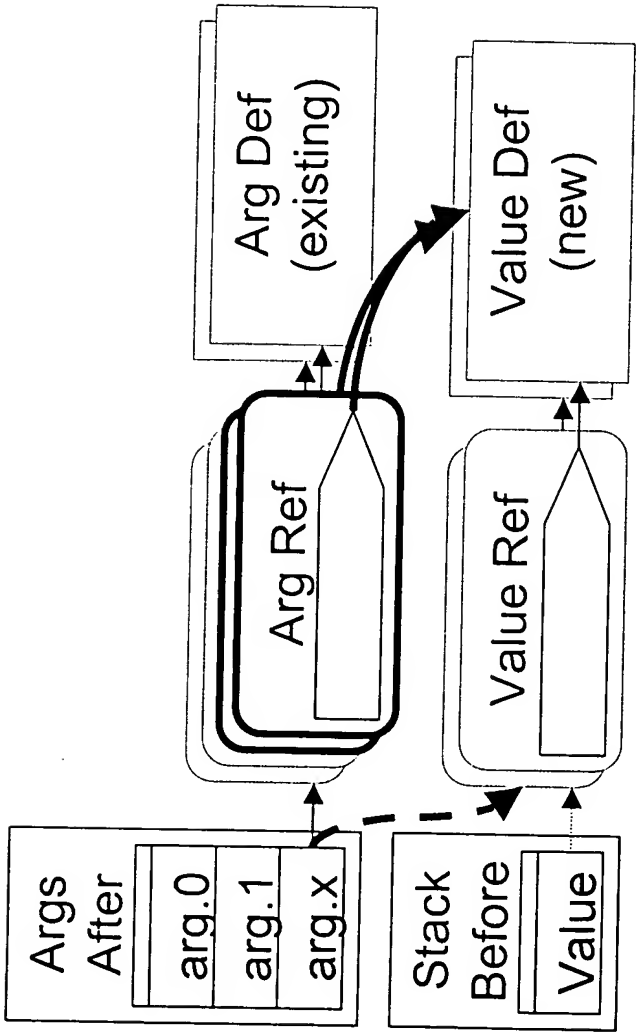

Arg Def
(existing)
Value Def
(new)
Arg Ref
Value Ref
Args
After
arg.0
arg.1
arg.x
Stack
Before
Value

Figure 12

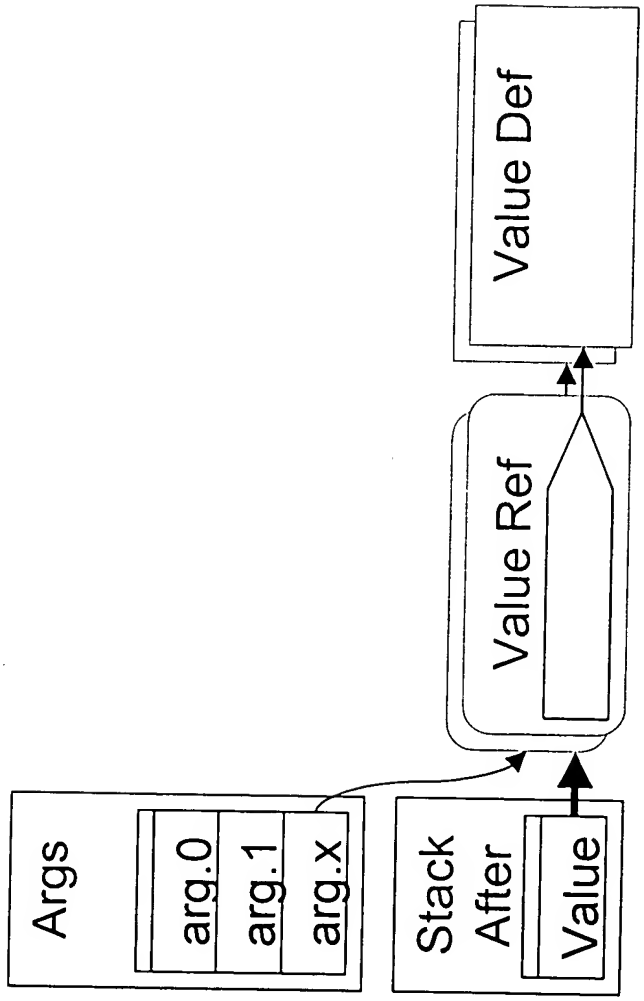


Figure 13

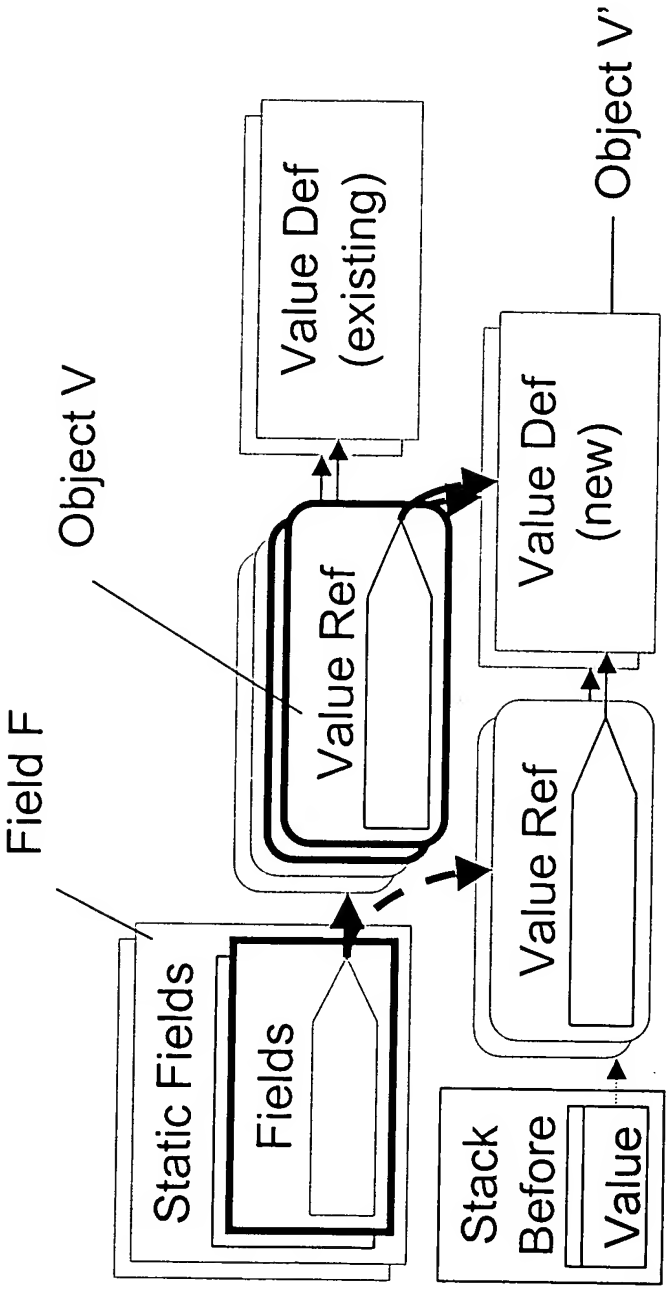

Field F
Static Fields
Fields
Object V
Value Ref
Value Def
(existing)
Value Ref
Value Def
(new)
Object V'
Stack
Before
Value

Figure 14

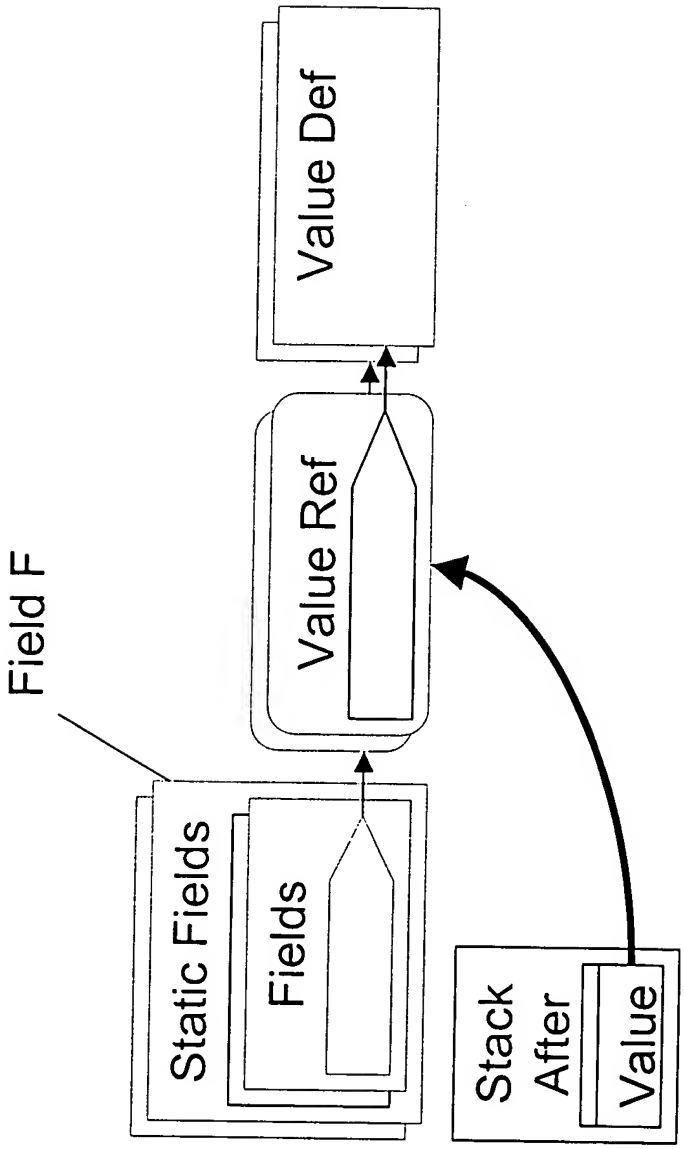

Field F
Static Fields
Fields
Value Ref
Value Def
Stack
After
Value

Figure 15

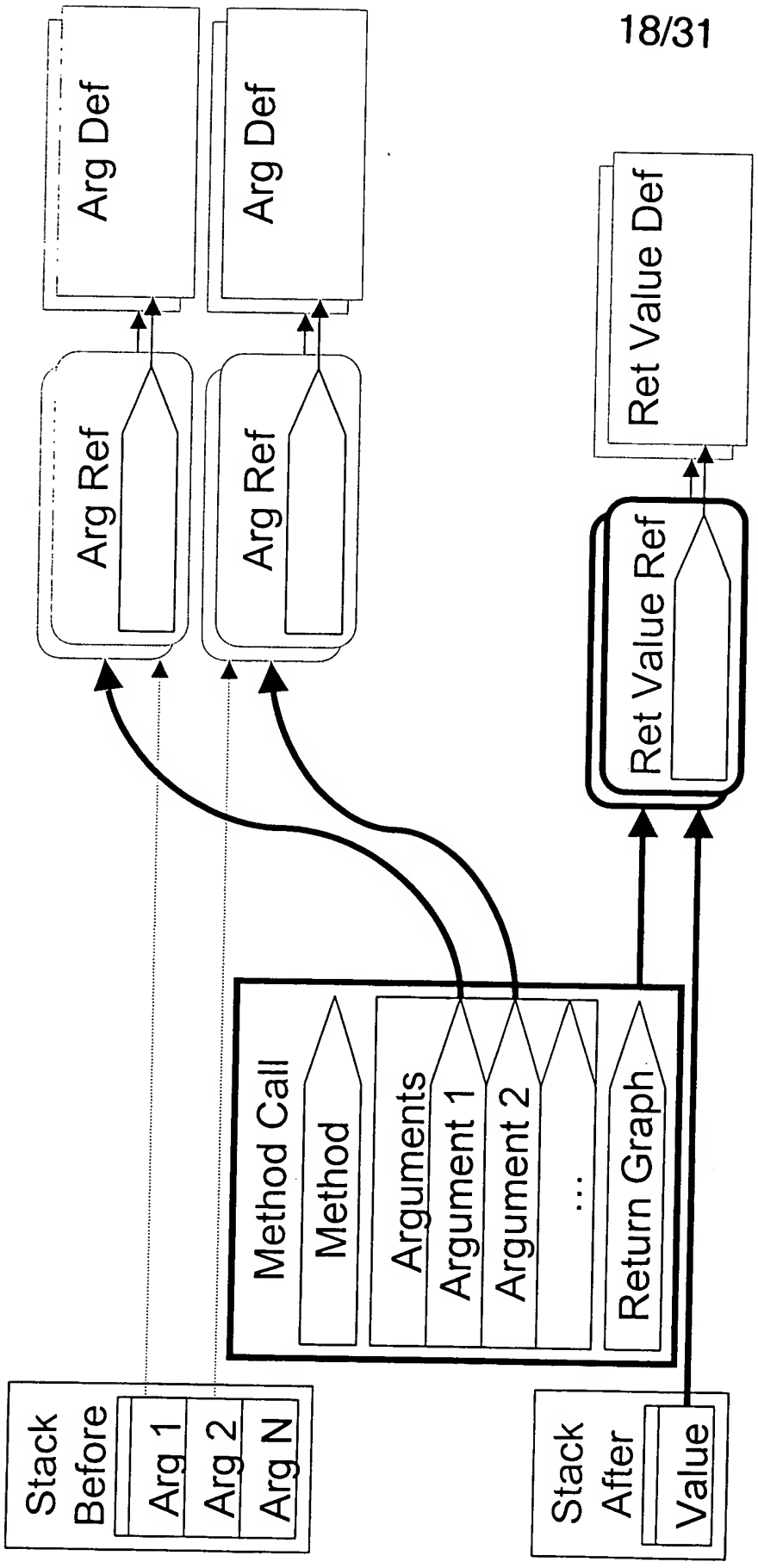

Stack Before
Arg 1
Arg 2
Arg N
Method Call
Method
Arguments
Argument 1
Argument 2
...
Return Graph
Stack After
Value
Arg Ref
Arg Ref
Arg Def
Arg Def
Ret Value Ref
Ret Value Def

Figure 16

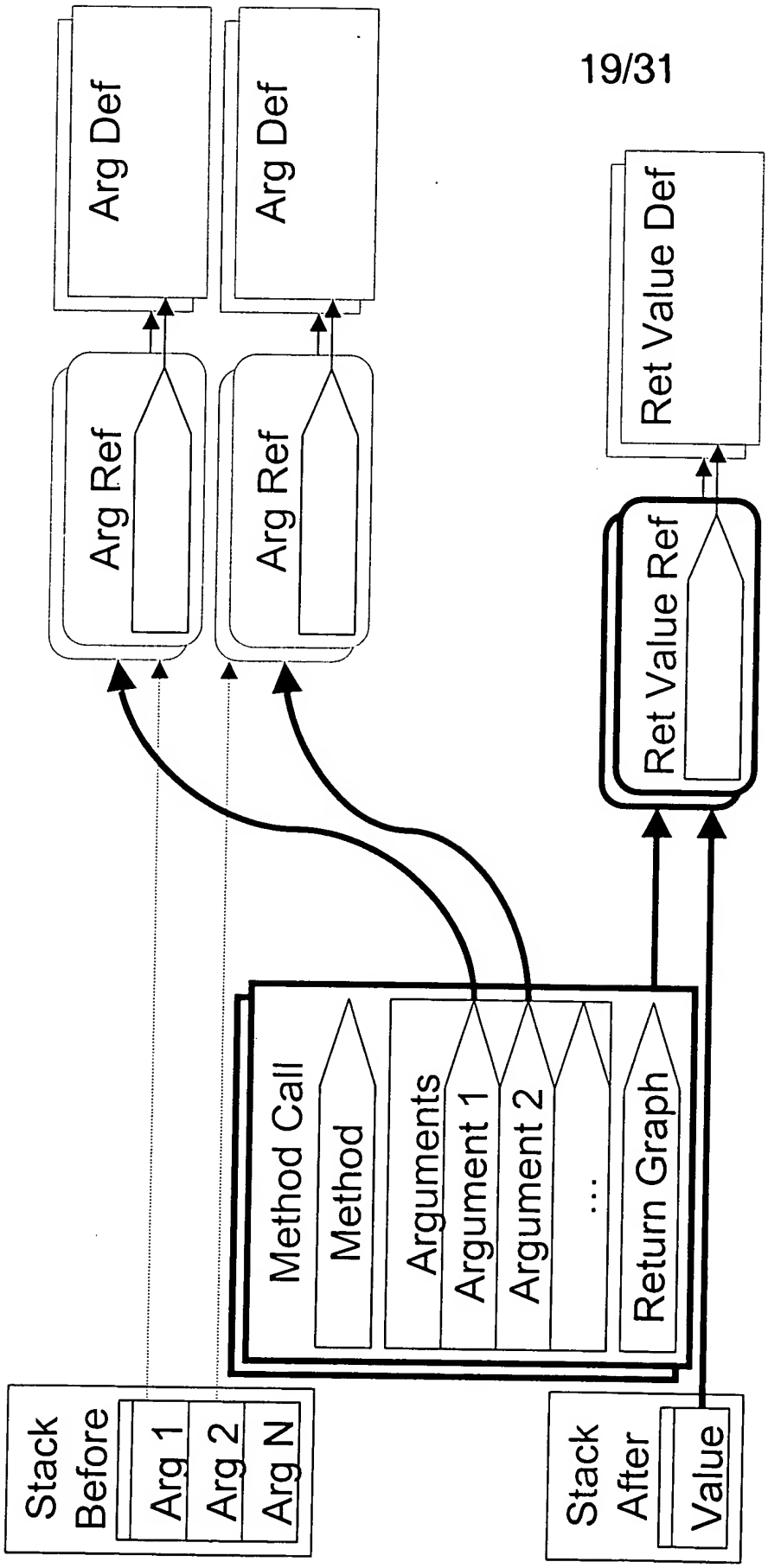
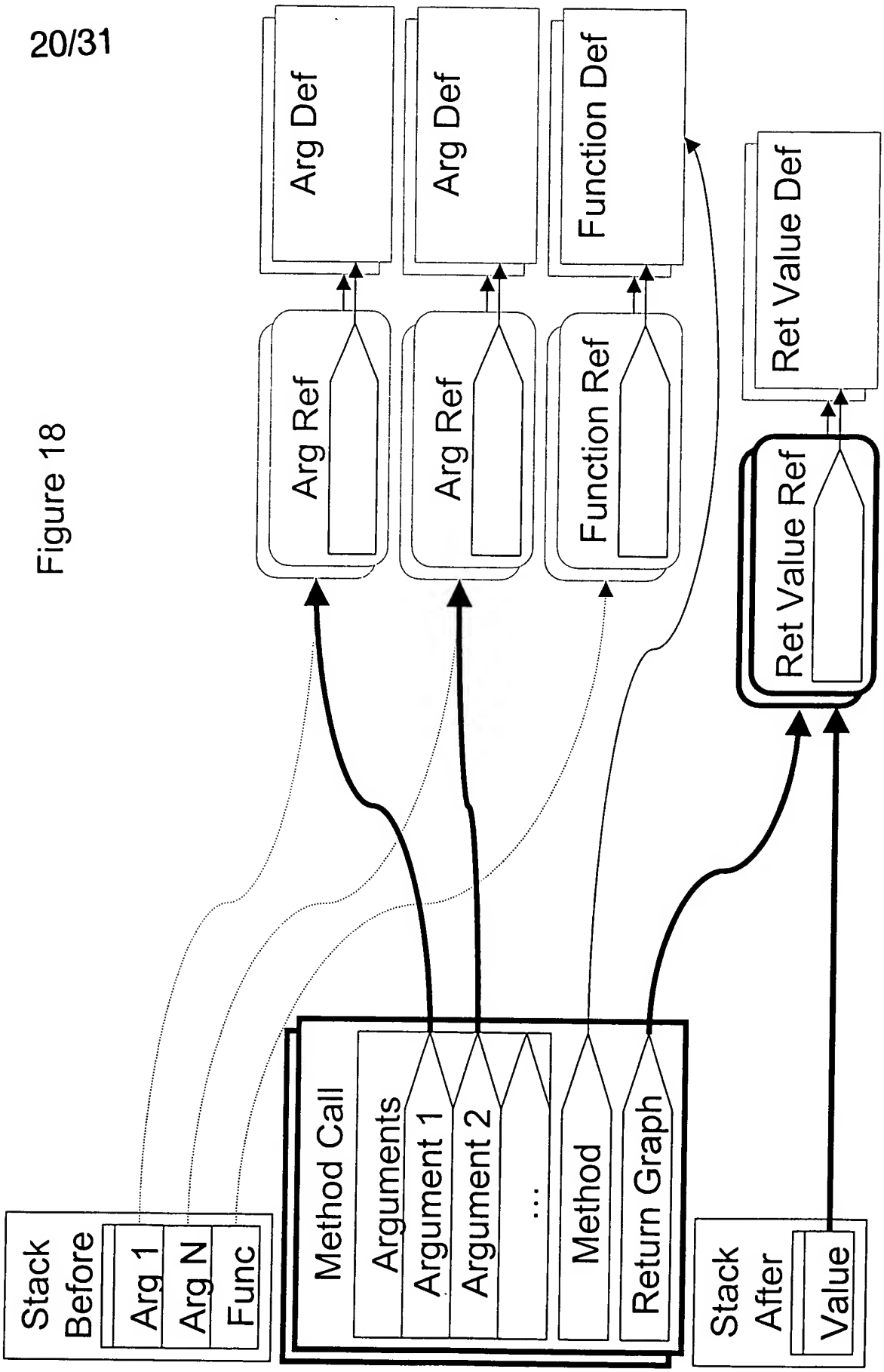

Arg Def
Arg Def
Arg Ref
Arg Ref
Ret Value Def
Ret Value Ref
Method Call
Method
Arguments
Argument 1
Argument 2
...
Return Graph
Stack Before
Arg 1
Arg 2
Arg N
Stack After
Value

Figure 17

Figure 18


Stack Before
Arg 1
Arg N
Func
Method Call
Arguments
Argument 1
Argument 2
...
Method
Return Graph
Arg Ref
Arg Ref
Function Ref
Arg Def
Arg Def
Function Def
Ret Value Ref
Ret Value Def
Stack After
Value

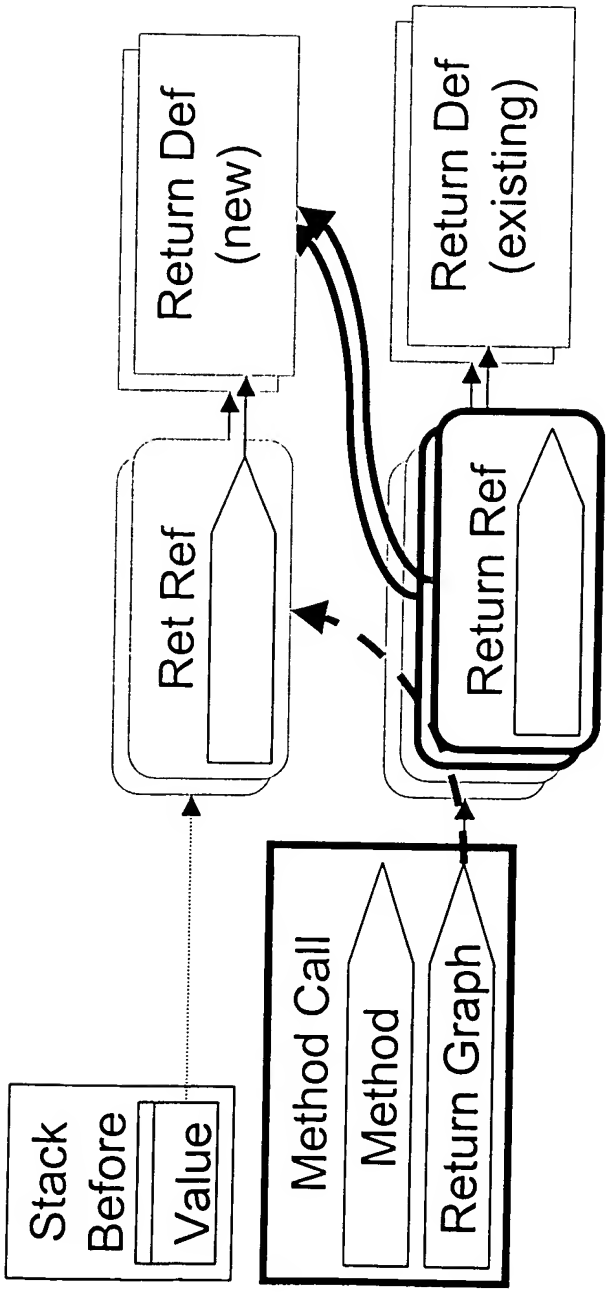

Stack Before
Value
Method Call
Method
Return Graph
Ret Ref
Return Ref
Return Def (new)
Return Def (existing)

Figure 19

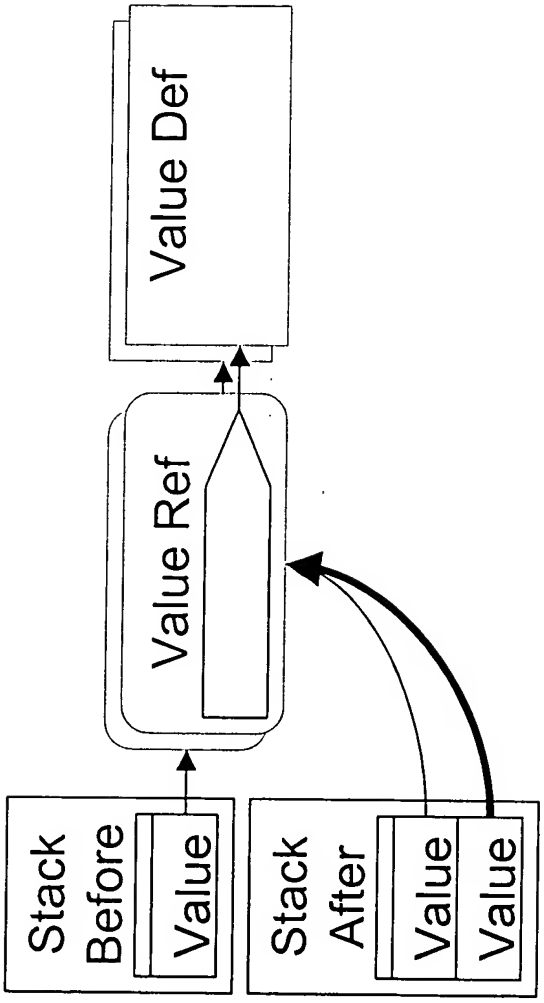

Value Def
Value Ref
Stack Before
Value
Stack After
Value
Value

Figure 20

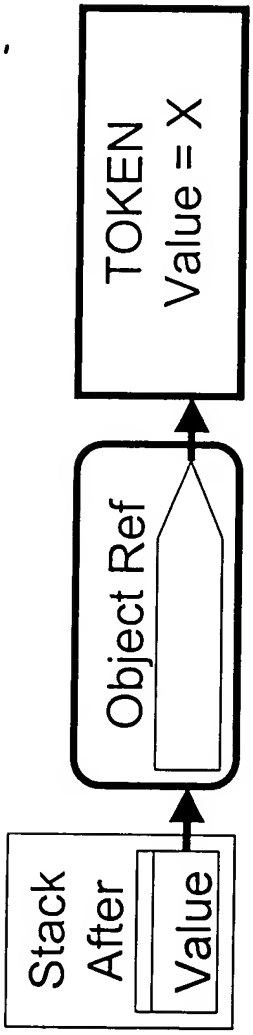


Figure 21

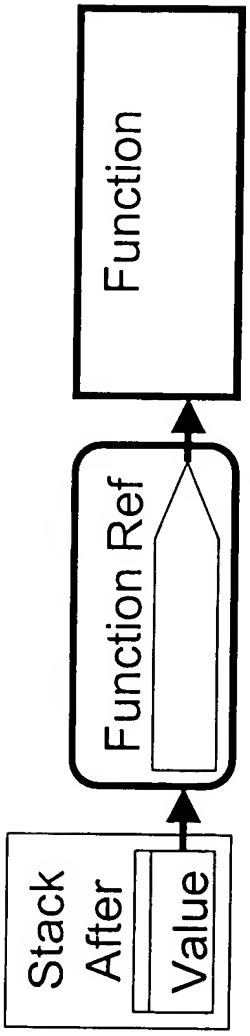


Figure 22

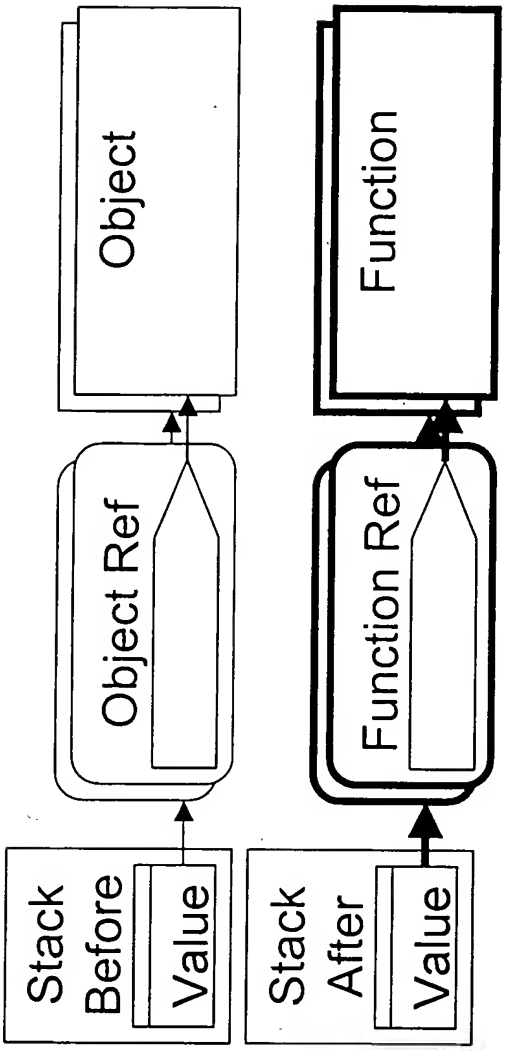

Stack
Before
Value
Object Ref
Object
Stack
After
Value
Function Ref
Function

Figure 23

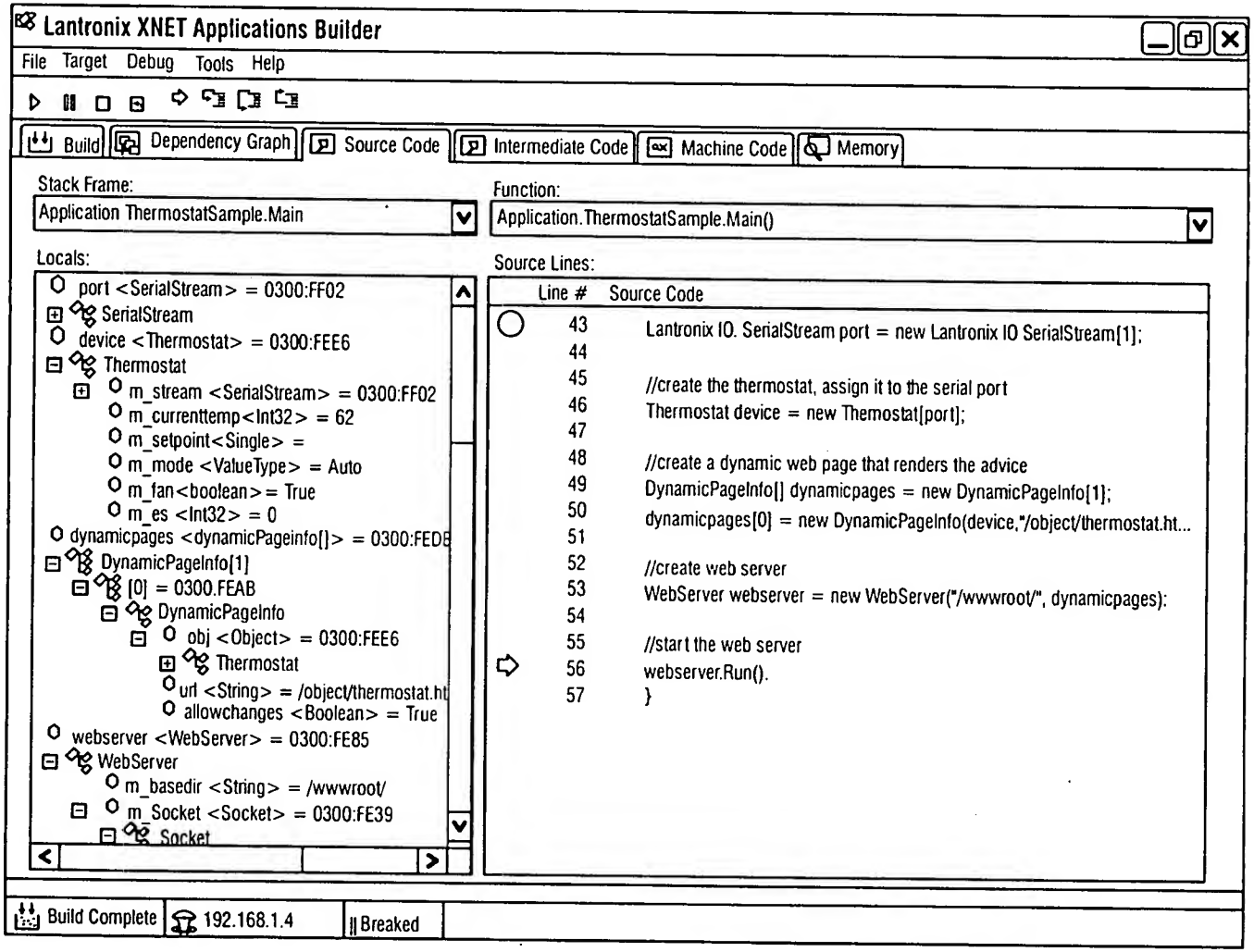

Lantronix XNET Applications Builder
File Target Debug Tools Help
Build
Dependency Graph
Source Code
Intermediate Code
Machine Code
Memory
Stack Frame:
Application ThermostatSample.Main
Function:
Application.ThermostatSample.Main()
Locals:
port <SerialStream> = 0300:FF02
SerialStream
device <Thermostat> = 0300:FEE6
Thermostat
m_stream <SerialStream> = 0300:FF02
m_currenttemp<Int32> = 62
m_setpoint<Single> =
m_mode <ValueType> = Auto
m_fan<boolean> = True
m_es <Int32> = 0
dynamicpages <dynamicPageinfo[]> = 0300:FEDE
DynamicPageInfo[1]
[0] = 0300.FEAB
DynamicPageInfo
obj <Object> = 0300:FEE6
Thermostat
url <String> = /object/thermostat.ht
allowchanges <Boolean> = True
webserver <WebServer> = 0300:FE85
WebServer
m_basedir <String> = /wwwroot/
m_Socket <Socket> = 0300:FE39
Socket
Source Lines:
Line # Source Code
43 Lantronix IO. SerialStream port = new Lantronix IO SerialStream[1];
44
45 //create the thermostat, assign it to the serial port
46 Thermostat device = new Themostat[port];
47
48 //create a dynamic web page that renders the advice
49 DynamicPageInfo[] dynamicpages = new DynamicPageInfo[1];
50 dynamicpages[0] = new DynamicPageInfo(device,"/object/thermostat.ht...
51
52 //create web server
53 WebServer webserver = new WebServer("/wwwroot/", dynamicpages);
54
55 //start the web server
56 webserver.Run().
57 }
Build Complete
192.168.1.4
Breaked

FIG. 24

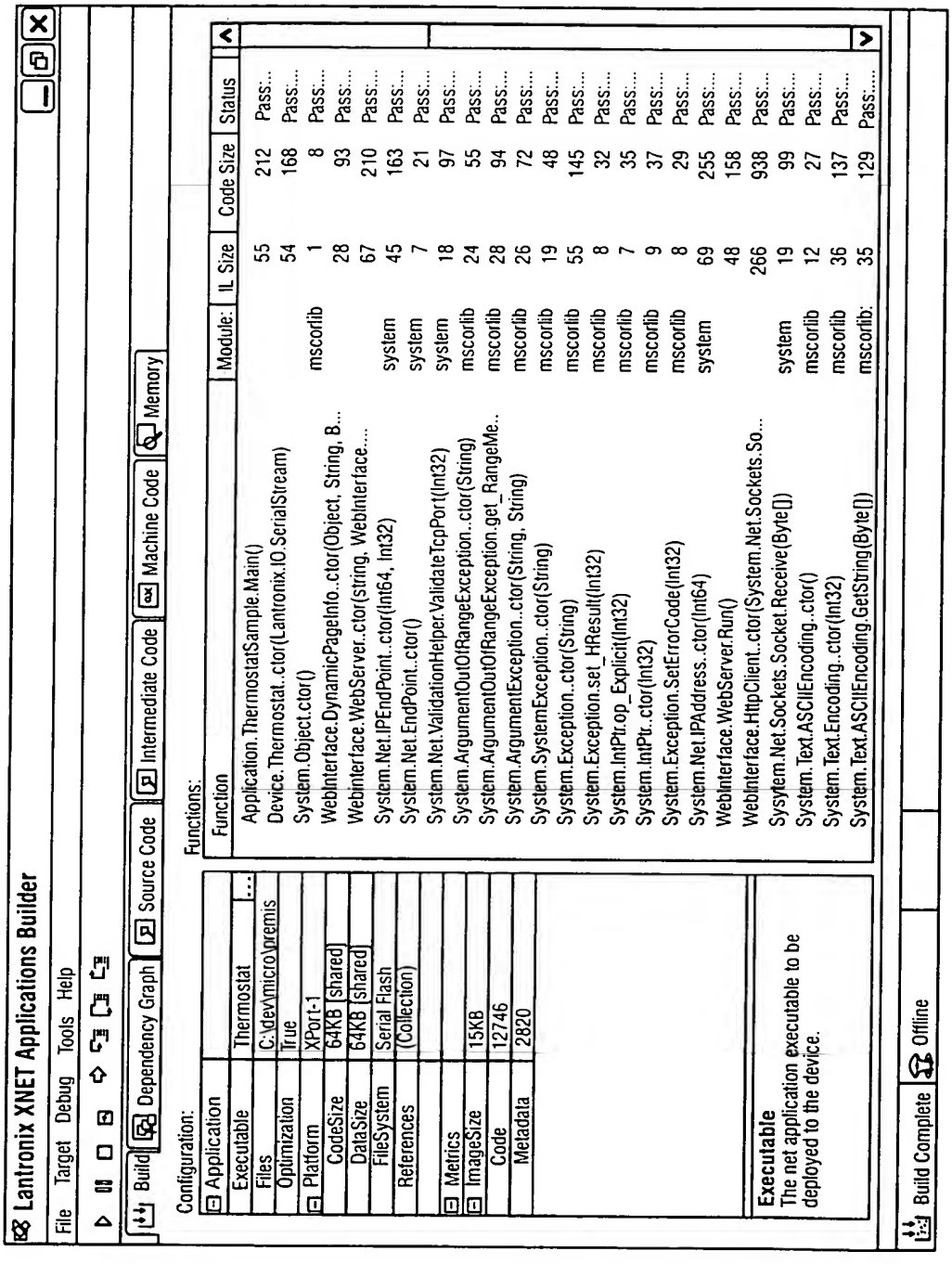

Lantronix XNET Applications Builder
File Target Debug Tools Help
Build
Dependency Graph
Source Code
Intermediate Code
Machine Code
Memory
Configuration:
Application
Executable
Files
Optimization
Platform
CodeSize
DataSize
FileSystem
References
Metrics
ImageSize
Code
Metadata
Thermostat
C:\dev\micro\premis
True
XPort-1
64KB [shared]
64KB [shared]
Serial Flash
(Collection)
15KB
12746
2820
Executable
The net application executable to be deployed to the device.
Functions:
Function
Module:
IL Size
Code Size
Status
Application.ThermostatSample.Main()
Device.Thermostat..ctor(Lantronix.IO.SerialStream)
System.Object.ctor()
WebInterface.DynamicPageInfo..ctor(Object, String, B...
WebInterface.WebServer..ctor(string, WebInterface....
System.Net.IPEndPoint..ctor(Int64, Int32)
System.Net.EndPoint..ctor()
System.Net.ValidationHelper.ValidateTcpPort(Int32)
System.ArgumentOutOfRangeException..ctor(String)
System.ArgumentOutOfRangeException.get_RangeMe...
System.ArgumentException..ctor(String, String)
System.SystemException..ctor(String)
System.Exception..ctor(String)
System.Exception.set_HResult(Int32)
System.IntPtr.op_Explicit(Int32)
System.IntPtr..ctor(Int32)
System.Exception.SetErrorCode(Int32)
System.Net.IPAddress..ctor(Int64)
WebInterface.WebServer.Run()
WebInterface.HttpClient..ctor(System.Net.Sockets.So...
Sysytem.Net.Sockets.Socket.Receive(Byte[])
System.Text.ASCIIEncoding..ctor()
System.Text.Encoding..ctor(Int32)
System.Text.ASCIIEncoding.GetString(Byte[])
55 212 Pass:...
54 168 Pass:...
1 8 Pass:...
mscorlib
28 93 Pass:...
67 210 Pass:...
system 45 163 Pass:...
system 7 21 Pass:...
system 18 97 Pass:...
mscorlib 24 55 Pass:...
mscorlib 28 94 Pass:...
mscorlib 26 72 Pass:...
mscorlib 19 48 Pass:...
mscorlib 55 145 Pass:...
mscorlib 8 32 Pass:...
mscorlib 7 35 Pass:...
mscorlib 9 37 Pass:...
mscorlib 8 29 Pass:...
system 69 255 Pass:...
48 158 Pass:...
266 938 Pass:...
system 19 99 Pass:...
mscorlib 12 27 Pass:...
mscorlib 36 137 Pass:...
mscorlib: 35 129 Pass:...
Build Complete
Offline

FIG. 25

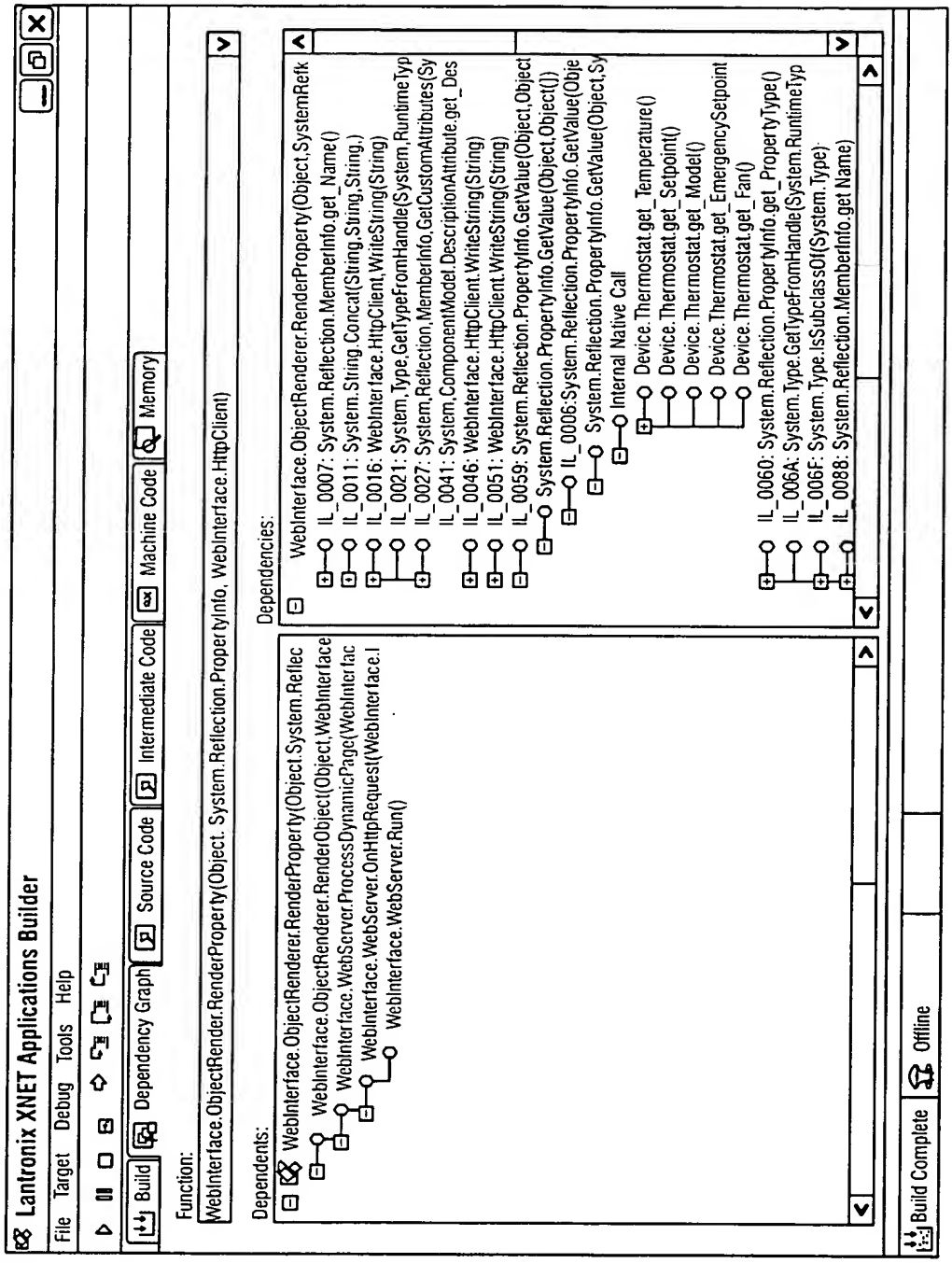

Lantronix XNET Applications Builder
File Target Debug Tools Help
Build
Dependency Graph
Source Code
Intermediate Code
Machine Code
Memory
Function:
WebInterface.ObjectRender.RenderProperty(Object. System.Reflection.PropertyInfo, WebInterface.HttpClient)
Dependents:
WebInterface.ObjectRenderer.RenderProperty(Object,System.Reflec
WebInterface.ObjectRenderer.RenderObject((Object,WebInterface
WebInterface.WebServer.ProcessDynamicPage(WebInterfac
WebInterface.WebServer.OnHttpRequest(WebInterface.I
WebInterface.WebServer.Run()
Dependencies:
WebInterface.ObjectRenderer.RenderProperty(Object,SystemRefk
IL_0007: System.Reflection.MemberInfo.get_Name()
IL_0011: System.String.Concat(String,String,String,)
IL_0016: WebInterface.HttpClient.WriteString(String)
IL_0021: System.Type.GetTypeFromHandle(System.RuntimeTyp
IL_0027: System.Reflection.MemberInfo.GetCustomAttributes(Sy
IL_0041: System.ComponentModel.DescriptionAttribute.get_Des
IL_0046: WebInterface.HttpClient.WriteString(String)
IL_0051: WebInterface.HttpClient.WriteString(String)
IL_0059: System.Reflection.PropertyInfo.GetValue(Object,Object
System.Reflection.PropertyInfo.GetValue(Object,Object())
IL_0006:System.Reflection.PropertyInfo.GetValue(Obje
System.Reflection.PropertyInfo.GetValue(Object,Sy
Internal Native Call
Device.Thermostat.get_Temperature()
Device.Thermostat.get_Setpoint()
Device.Thermostat.get_Model()
Device.Thermostat.get_EmergencySetpoint
Device.Thermostat.get_Fan()
IL_0060: System.Reflection.PropertyInfo.get_PropertyType()
IL_006A: System.Type.GetTypeFromHandle(System.RuntimeTyp
IL_006F: System.Type.IsSubclassOf(System.Type)
IL_0088: System.Reflection.MemberInfo.get Name()
Build Complete
Offline

FIG. 26

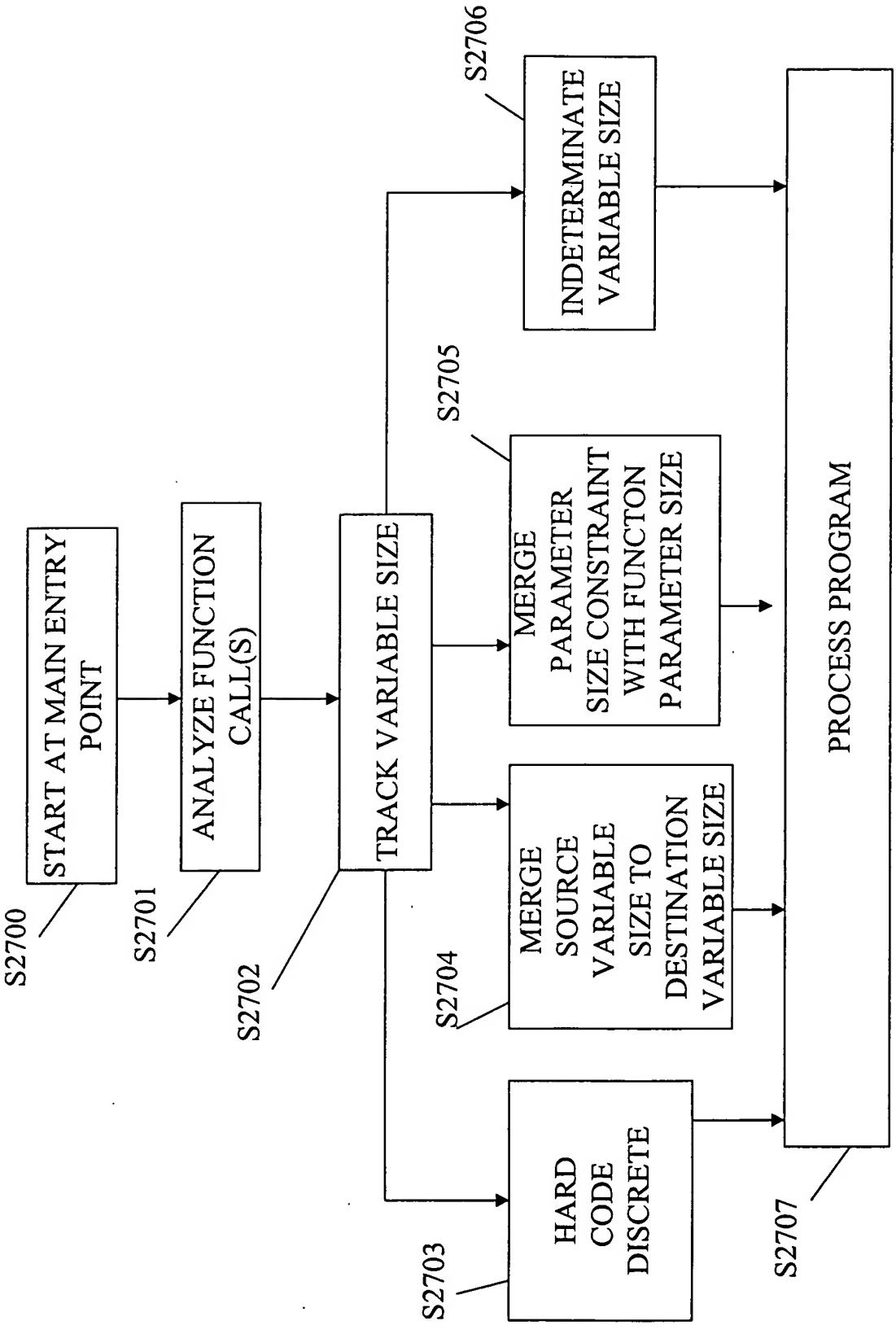

START AT MAIN ENTRY POINT
ANALYZE FUNCTION CALL(S)
TRACK VARIABLE SIZE
MERGE PARAMETER SIZE CONSTRAINT WITH FUNCTON PARAMETER SIZE
MERGE SOURCE VARIABLE SIZE TO DESTINATION VARIABLE SIZE
HARD CODE DISCRETE
INDETERMINATE VARIABLE SIZE
PROCESS PROGRAM
S2700
S2701
S2702
S2703
S2704
S2705
S2706
S2707

FIGURE 27

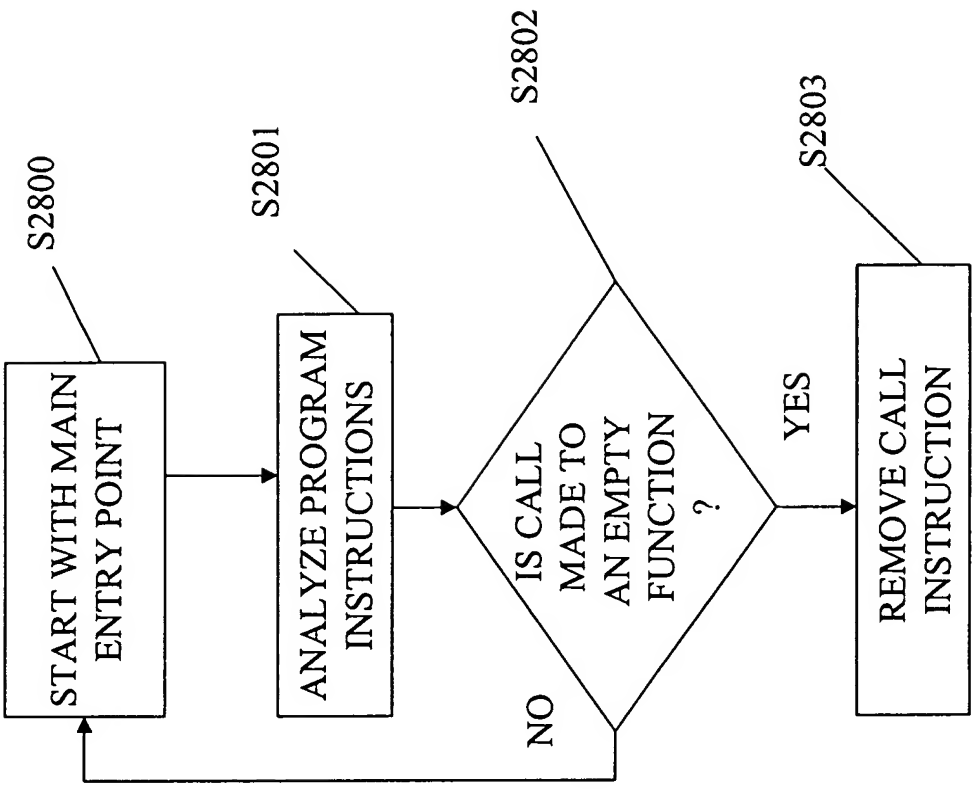

S2800
START WITH MAIN ENTRY POINT
S2801
ANALYZE PROGRAM INSTRUCTIONS
S2802
IS CALL MADE TO AN EMPTY FUNCTION ?
NO
YES
S2803
REMOVE CALL INSTRUCTION

FIGURE 28

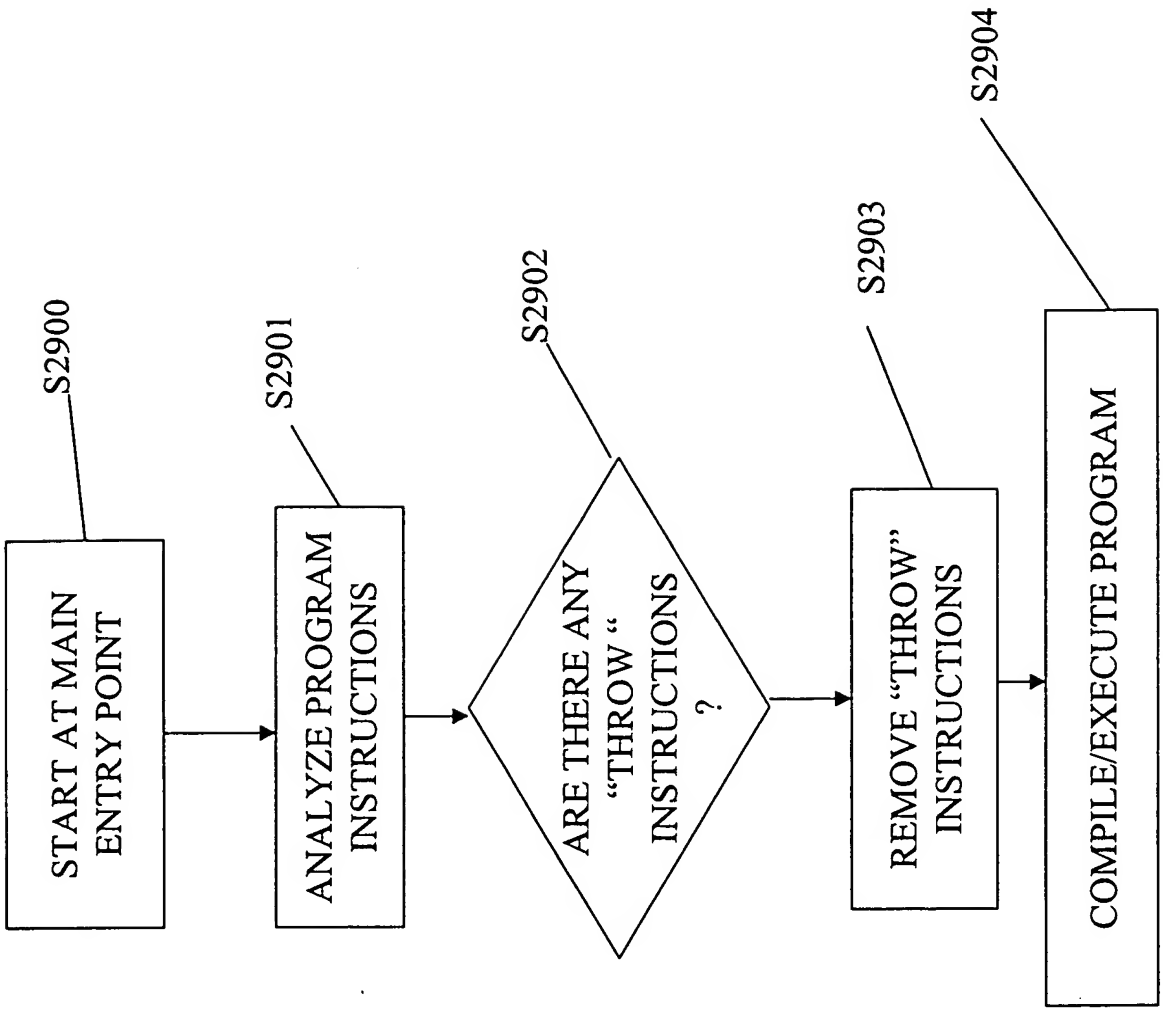

S2900
START AT MAIN ENTRY POINT
S2901
ANALYZE PROGRAM INSTRUCTIONS
S2902
ARE THERE ANY "THROW" INSTRUCTIONS ?
S2903
REMOVE "THROW" INSTRUCTIONS
S2904
COMPILE/EXECUTE PROGRAM

FIGURE 29

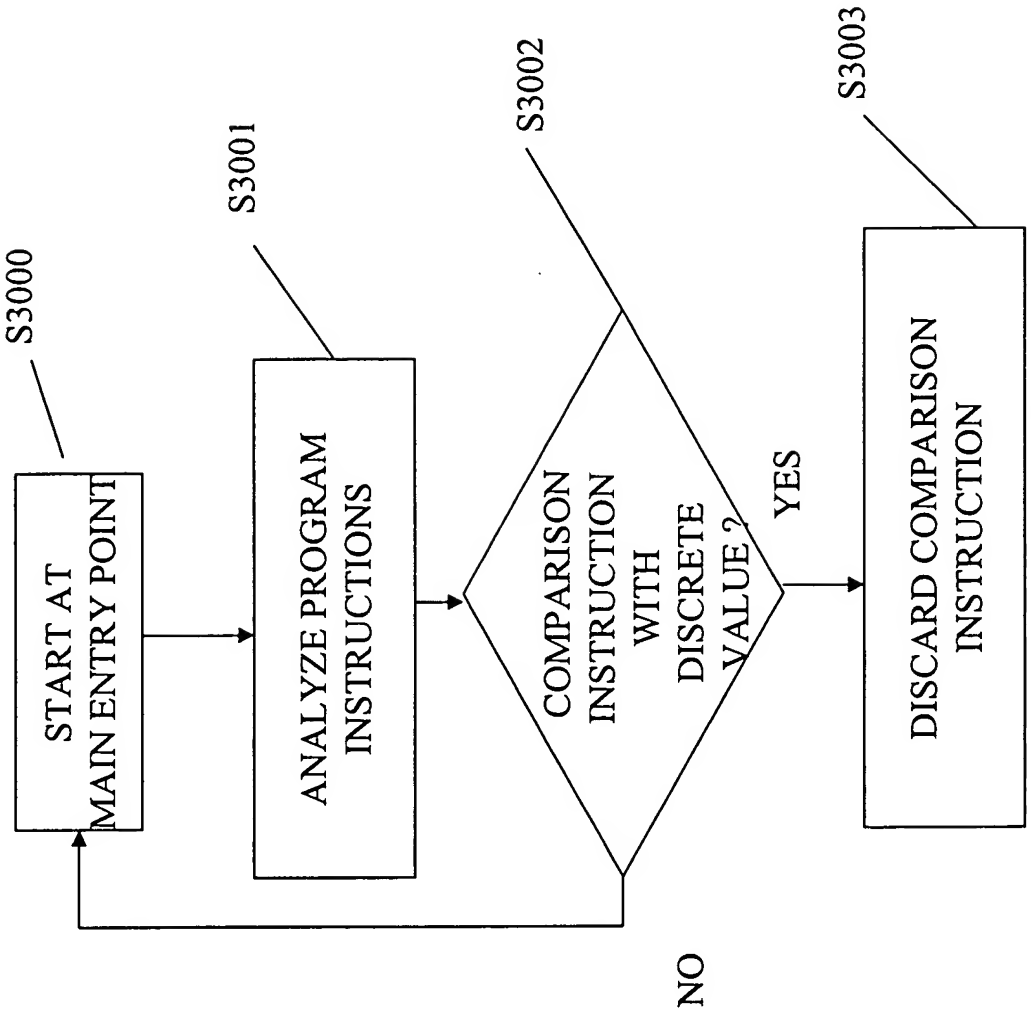

S3000
START AT MAIN ENTRY POINT
S3001
ANALYZE PROGRAM INSTRUCTIONS
S3002
COMPARISON INSTRUCTION WITH DISCRETE VALUE?
YES
NO
S3003
DISCARD COMPARISON INSTRUCTION

FIGURE 30